

REMARKS:

With this amendment and response, claims 23, 24, 26 to 36, 38 to 48 and 50 to 58 are pending. Claims 23, 29, 35 and 47 to 58 have been amended. Claims 25, 37 and 49 have been canceled. Claims 23, 35 and 47 are independent claims. Reconsideration and further examination are respectfully requested.

Overview

This amendment effects identical changes as the Response to Final Office Action dated Jan. 22, 2002. The arguments presented in that Response are reproduced below, along with further arguments presented in response to statements made in the Advisory Action dated Feb. 12, 2003.

Claim Rejections

The Office Action made the following rejections:

- Claims 23 to 26, 28, 34 to 38, 40, 46 to 50, 52 and 58 were rejected under 35 U.S.C. § 102(b) over U.S. Patent No. 5,781,716 (Hemphill).
- Claims 27, 29, 39, 41, 51 and 53 were rejected under 35 U.S.C. § 103(a) over Hemphill.

- Claims 30 to 33, 42 to 45 and 54 to 57 were rejected under 35 U.S.C. § 103(a) over Hemphill in view of U.S. Patent No. 5,720,029 (Kern).

Applicant notes that these same references were applied in the previous Office Action in this case. In view of the similarity of these rejections, they are discussed together herein to the extent possible and reasonable.

Paragraph 11 of the Office Action appears to state that “Applicant mischaracterize[d] Hemphill’s system” in the response in this case mailed on June 27, 2002. Applicant respectfully disagrees. As shown herein, Applicant submits that Applicant did not mischaracterize the system shown in Hemphill.

Applicant believes that Applicant has urged a rational position. All statements made regarding Hemphill (and any other cited art) have been made in good faith after reasonable investigation. However, Applicant (and Applicant’s undersigned representative) acknowledges that reasonable people might differ in their interpretation of the art. If, after review of this amendment and response, the Examiner considers Applicant’s characterization to be somehow incorrect, in whole or in part, Applicant requests that the Examiner state how Applicant’s characterization is incorrect.

Applicant's statements regarding Hemphill from the response mailed on June 27, 2002, are reproduced below:

Hemphill shows fault-tolerant multiple network servers in which multiple servers concurrently act as back-up servers for each other. Thus, as shown in Figure 1 of Hemphill, servers 100 and 200 are both connected to disk subsystems 102 and 202. However, each server itself is not seen to include plural nodes connected to one set of storage devices, with the nodes capable of processing file server commands for the set of storage devices. For example, primary controller 112 and recovery controller 116 in server 100 are connected to different disk subsystems 102 and 202, not to the same disk subsystem. Thus, Hemphill is not seen to disclose or to suggest claim 23's feature of at least a pair of nodes disposed in a file server, each of which is capable of processing file server commands for a set of storage elements. [Response to Office Action mailed June 27, 2002, page 14]

For the Examiner's convenience, support in Hemphill for each sentence of this characterization is discussed herein. It is hoped that after review of this discussion, the Examiner will agree that Applicant's statements regarding the system shown in Hemphill are accurate.

- "Hemphill shows fault-tolerant multiple network servers in which multiple servers concurrently act as back-up servers for each other."

See Abstract of Hemphill, line 1: "A fault tolerant multiple network server system in which multiple servers concurrently act as back-up servers for each other even while they are providing their own server services to the system."

- “Thus, as shown in Figure 1 of Hemphill, servers 100 and 200 are both connected to disk subsystems 102 and 202.”

Figure 1 of Hemphill shows exactly this arrangement. Servers 100 and 200 are labeled as such in the figure. Furthermore, these elements are referred to as “servers” throughout the Detailed Description in Hemphill.

The Office Action appears not to give weight to Hemphill’s usage of the term “server” for its elements 100 and 200. Paragraph 2 of the Office Action states that “Hemphill discloses ... at least a pair of nodes disposed in said file server (100, 200).” This statement could be read to indicate that elements 100 and 200 are either “a pair of nodes” or “said file server.” The Office Action appears to clarify that it is referring to elements 100 and 200 as “a pair of nodes” by stating that “Hemphill discloses a file server wherein each pair of nodes (100, 200)” Applicant’s interpretation differs. Where the Office Action implies that Hemphill’s servers 100 and 200 are equivalent to the claimed “pair of nodes disposed in said file server,” Applicant urges that the Office Action is incorrect and respectfully requests that this evaluation made by the Office Action be reconsidered and withdrawn.

As used in the application, the term “node” has a different meaning than the term “server.” In particular, page 7, lines 6 and 7, of the application recites that a “file server

system 100 includes a set of file servers 110, each including a coupled pair of file server nodes 111.” Applicant’s position is bolstered by a comparison of Figure 1 of the application with Figure 1 of Hemphill, which reveals the correspondence between the application’s server 110 and Hemphill’s servers 100 and 200.

In view of the foregoing, Applicant respectfully submits that the statement “as shown in Figure 1 of Hemphill, servers 100 and 200 are both connected to disk subsystems 102 and 202” is accurate.

- “However, each server itself is not seen to include plural nodes connected to one set of storage devices, with the nodes capable of processing file server commands for the set of storage devices.”

This statement also corresponds to the arrangement shown in Figure 1 of Hemphill. In that figure, each *server* (100, 200) is connected to both disk subsystems 102 and 103. The Office Action appears to consider that Hemphill’s disk subsystems 102 and 202 “each [have] a plurality of storage elements.” Thus, the Office Action appears to consider each individual disk block as a “storage element.” Even using this interpretation, neither server 100 nor server 200 is shown as including plural elements (e.g., nodes) that are both connected to one of the disk subsystems.

In more detail, the application and claims define each *server* as having a pair of *nodes*, with each *node* being “capable of processing file server commands for said set of storage elements.” At first glance, it might appear that controllers 112 and 116 in server 100 and controllers 216 and 212 in server 200 correspond to such nodes. However, Applicant submits that these controllers are not actually equivalent to the claimed nodes, at least a pair of which are “disposed in said file server” and are “connected to a set of storage elements.” Such an arrangement would include, for example, both a line drawn from primary controller 112 to disk subsystem 102 *and* a line drawn from recovery controller 116 to disk subsystem 102. Instead, while Figure 1 of Hemphill does show a line drawn from primary controller 112 to disk subsystem 102, the line from recovery controller 116 is drawn to a *different* disk subsystem 202. Thus, *server* 100 does not include plural *nodes*, each of which is connected to a common set of storage elements. (Applicant notes that in this part of the discussion of Hemphill, Applicant inadvertently used the terms “storage devices” and “storage elements” interchangeably. This usage is not believed to be important; however, Applicant points it out here for the sake of completeness.)

In contrast, Applicant directs the Examiner’s attention to Figure 1 of the application. In that figure, two servers 110 are shown. Each server includes two nodes 111. For each server, both nodes 111 are connected to a common set of storage devices 112: On the left server 110, the left node 111 is connected to a set storage devices 112

via a line from the bottom of the node across the top of the storage devices, and the right node 111 is connected to the *same* set of storage devices 112 via a line from the bottom of the node across the bottom of the storage devices. The same arrangement is shown for the right server 110.

In view of the foregoing, Applicant's statement that "each server itself [in Hemphill] is not seen to include plural nodes connected to one set of storage devices, with the nodes capable of processing file server commands for the set of storage devices," is believed to be accurate.

- "For example, primary controller 112 and recovery controller 116 in server 100 are connected to different disk subsystems 102 and 202, not to the same disk subsystem."

This accurately describes the arrangement shown in Figure 1 of Hemphill.

- Thus, Hemphill is not seen to disclose or to suggest claim 23's feature of at least a pair of nodes disposed in a file server, each of which is capable of processing file server commands for a set of storage elements.

This sentence merely draws a conclusion that follows from the sentences that precede it: Neither of Hemphill's *servers* 100 and 200 includes plural *nodes* disposed

therein, with both of the *nodes* capable of processing file server commands for a set of storage elements (e.g., disk subsystem 102 or disk subsystem 202).

In view of the foregoing analysis, Applicant strongly urges that all of Applicant's statements regarding the cited art, specifically Hemphill, are accurate.

Applicant also respectfully requests a telephonic interview with the Examiner, the Examiner's supervisor Glenton Burgess, Applicant's undersigned representative Dane. C. Butzer, and Mr. Butzer's supervising attorney at the Swernofsky Law Group, Steven A. Swernofsky, regarding this matter and to advance the prosecution of this case.

Claims Amendments

Applicant has amended the claims for formal reasons and to comply with changes made in a corresponding PCT application.

Response to Rejections

Amended claim 23 recites a file server including a common set of storage elements, at least a pair of nodes disposed in the file server, at least one inter-node connectivity

element coupled to the nodes, and a connection for coupling the file server commands to the nodes. In claim 23, each of the nodes is connected to the common set of storage elements and includes a processor and a memory so as to be capable of processing file server commands for the common set of storage elements.

Hemphill is not seen to disclose or to suggest claim 23's feature of at least a pair of nodes disposed in a file server, each of which is connected to and capable of processing file server commands for a common set of storage elements.

Applicant acknowledges that prior to this Response, claim 23 did not explicitly state that both of the nodes in the pair were connected to and capable of processing file server commands for a *common* set of storage elements. However, basic rules of claim interpretation and antecedence dictated that the claim referred to such a common set of storage elements. In particular, that set of storage elements was introduced with the article "a." The claim went on to state that "each of said nodes [is] connected to said set of storage elements and ... [is] capable of processing file server commands for said set of storage elements." Use of the article "said" indicated that the phrase was referring back to the same common set of storage elements. Thus, this phrase indicated that both of the *nodes* in the pair are connected to and capable of processing file server commands for a *common* set of storage elements.

Furthermore, Applicant has now amended claim 23 (and other claims) to make explicit that the nodes are capable of processing file server commands for a *common* set of storage elements.

Applicant notes that claim 23 is an open-ended claim that does not exclude additional elements, including possibly another set of storage elements. Rather, the claim requires that both *nodes* are capable of processing file server commands for a *common* set of storage elements. Thus, additional storage elements arranged in a similar or a different manner can be added without departing from the scope of the claim.

Kern, which was applied against certain of the dependent claims, shows a disaster recovery system that provides remote data shadowing between a primary and a secondary site. This system is not seen to add anything to remedy the foregoing deficiencies of Hemphill.

For at least the above reasons, claim 23 is believed to be allowable over Hemphill and Kern. Claims 24 to 34 depend directly or indirectly from claim 23 and therefore also are believed to be allowable over Hemphill and Kern. Accordingly, allowance of claims 23 to 34 is respectfully requested.

Claims 35 to 46 are method claims substantially corresponding to claims 23 to 34. Claims 47 to 58 are Beauregard-style claims substantially corresponding to claims 35 to 46.

Accordingly, claims 35 to 58 also are believed to be allowable over Hemphill and Kern, and such action is respectfully requested.

Reply to Advisory Action

In the Continuation Sheet for the Advisory Action dated Feb. 12, 2003, the Examiner “contend[ed] that the term ‘node’ in the application is very vague and the servers used in Hemphill meet that definition of node found on page 7, lines 6 and 7.” The Examiner also “note[d] that ‘node’ and ‘server’ are broad terms” and that “[t]hese terms are met by Hemphill.”

Applicant agrees that the terms “node” and “server” are broad terms. However, Applicant respectfully submits that even if Hemphill’s servers meet the definition of “nodes” (a point which Applicant respectfully does not concede), Hemphill still does not disclose or suggest the invention as claimed.

Independent claims 23, 35 and 47 each include language along the lines of the following: “... at least a pair of nodes disposed in said file server, each of said nodes being connected to said common set of storage elements and including a processor and a memory so as to be capable of processing file server commands for a common set of storage elements ...” Significantly, in each of these claims, the nodes are “disposed in said file server.”

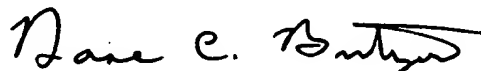
To Applicant, this claim language clearly indicates that “at least a pair” of Hemphill’s servers would in turn have to be “disposed in [a] file server” in order for those servers to be equivalent to the claimed nodes. Applicant respectfully submits that such clearly is not the case in Hemphill and that Hemphill therefore does not meet the language of independent claims 23, 35 and 47.

Closing

In view of the foregoing amendments and remarks, the entire application is believed to be in condition for allowance, and such action is respectfully requested at the Examiner’s earliest convenience.

Applicant’s undersigned attorney, Dane C. Butzer, can be reached at (614) 486-3585. Applicant’s supervising attorney, Steven A. Swernofsky, can be reached at (650) 947-0700 x306. All correspondence should continue to be directed to the address indicated below.

Respectfully submitted,



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Changes to Claims

Pursuant to 37 C.F.R. § 1.121(c)(ii), changes to any claims effected by the accompanying paper are indicated below.

Claims 25, 37 and 49 have been canceled.

Claims 23, 29, 35 and 47 to 58 have been amended as follows:

23. (Amended) A file server including

a common set of storage elements;

at least a pair of nodes disposed in said file server, each of said nodes being connected to said common set of storage elements and including a processor and a memory so as to be capable of processing file server commands for said common set of storage elements;

at least one inter-node connectivity element coupled to said nodes; and

a connection for coupling said file server commands to said nodes.

29. (Amended) A file server as in claim 23, wherein said common set of storage elements includes a RAID storage system.

35. (Amended) A method of operating a file server including

operating at least a pair of nodes disposed in said file server, each of said nodes being connected to a common set of storage elements and including a processor and a memory so as to be capable of processing file server commands for [a] said common set of storage elements;

communicating with other nodes in at least one other file server through at least one inter-node connectivity element coupled to said nodes; and

coupling said file server commands to said nodes.

47. (Amended) A memory storing information including instructions, the instructions executable by a processor to operate a file server, the instructions comprising:

operating at least a pair of nodes disposed in said file server, each of said nodes being connected to a common set of storage elements and including a processor and a memory so as to be capable of processing file server commands for [a] said common set of storage elements;

communicating with other nodes in at least one other file server through at least one inter-node connectivity element coupled to said nodes; and

coupling said file server commands to said nodes.

48. (Amended) A memory [method of operating a file server] as in claim 47, wherein each of said pair of nodes are disposed to failover to each other.

50. (Amended) A memory [method of operating a file server] as in claim 47, wherein

each of said storage elements corresponds to one node of said pair;
each of said storage elements is coupled to both nodes of said pair;
whereby both nodes in said pair are equally capable of controlling said storage elements.

51. (Amended) A memory [method of operating a file server] as in claim 47, wherein said connectivity element includes a NUMA network.

52. (Amended) A memory [method of operating a file server] as in claim 47, wherein scaling for a file server system that includes said file server can be achieved by coupling said pair of nodes to another pair of nodes in another file server through said inter-node connectivity element

53. (Amended) A memory [method of operating a file server] as in claim 47, wherein said common set of storage elements includes a RAID storage system.

54. (Amended) A memory [method of operating a file server] as in claim 47, wherein said pair of nodes includes a first node and a second node;
wherein when said file server commands are directed to said first node, said file server commands are executed at said first node, and a copy of said file server commands are stored at said second node; and

wherein when said file server commands are directed to said second node, said file server commands are executed at said second node, and a copy of said file server commands are stored at said first node.

55. (Amended) A memory [method of operating a file server] as in claim 54,
wherein when said file server commands are directed to said first node and said first node is inoperable, said file server commands are executed at said second node; and
wherein when said file server commands are directed to said second node and said second node is inoperable, said file server commands are executed at said first node.

56. (Amended) A memory [method of operating a file server] as in claim 47,
wherein said pair of nodes includes a first node and a second node;
wherein said first node responds to said file server commands while said second node records said file server commands; and
wherein said pair of nodes are disposed to failover from said first node to said second node.

57. (Amended) A memory [method of operating a file server] as in claim 47,
wherein said pair of nodes includes a first node and a second node;
wherein said first node responds to a first one of said file server commands while said second node records said first one of said file server commands;

wherein said second node responds to a second one of said file server commands while said first node records said second one of file server commands; and
said pair of nodes are disposed to failover from said first node to said second node.

58. (Amended) A memory [method of operating a file server] as in claim 47,
wherein said pair of nodes includes a first node and a second node;
wherein said first node controls said storage elements in response to said file server commands while said second node is coupled to said storage elements and does not control said storage elements in response to said file server commands.